



# *The Earth Science* **DIGEST**

**MAY 1947**



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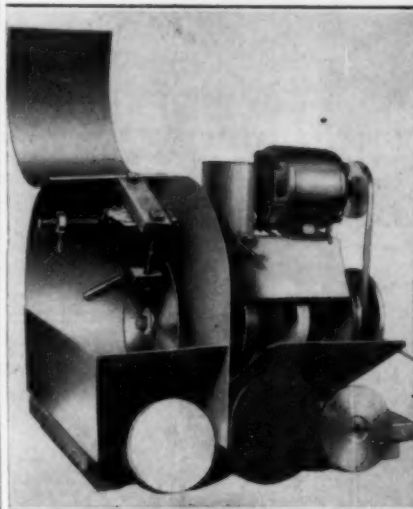
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## Letters to the Editor

Gentlemen:

May I take this opportunity to express my appreciation for the article in the March issue entitled "Vacationing With A Purpose in Pennsylvania". The various mines and quarries mentioned, several of which I have already visited are all within a few hours time of my home. I shall surely visit the ones which are new to me.

Yours very sincerely,

Paul R. Austin,  
Pottstown, Pa.

Dear Mr. Berry:

I have distributed the copies of The Earth Science Digest which you were kind enough to send me among the faculty and some of the more advanced students.

Your magazine is excellent, and you are to be commended for your excellent semi-technical treatment of geology.

Very truly yours,

D. L. Frizzell,  
Dept. of Geology,  
University of Texas,  
Austin, Texas.

The Editor,  
Earth Science Digest.  
Dear Sir:

I would like to thank you for sending two complimentary issues of E. S. D. Particularly noticeable was the improvement in printing. May I wish E. S. D. much success and a long life among the increasing number of gem and mineral minded craftsmen.

Woodrow Oldfield,  
Victoria, Australia.

(To Page 5)

## Book Review

*Adventures in Jade* by James Lewis Kraft. "Adventures in Jade" should prove to be a welcome addition to the libraries of those who love and work with gem stones as well as those who appreciate fine literary craftsmanship.

The author begins by describing "How a Hobby Began". His fellow hobbyists will relish a tale that in many instances parallels their own.

Then comes a discussion of the nature of jade and the symbolism which is attached to this stone. This is followed by some excellent reasoning concerning the appearance of jade on the North American Continent and the discovery of deposits of gem quality jade in this part of the earth.

There is a deliberate avoidance of shop talk. Numerous sources of information as to the methods of working jade are given in the bibliography, but the author advises all who would work with jade to "set up shop and see for themselves". The result will be that best tool of all — experience — plus the enjoyable discourses with fellow enthusiasts.

For those who would add to their lore of the most mysterious of rocks every sentence is as graceful as the contours of a piece of jade upon which many hours, even days, have been spent by one who has the vision to see the inherent beauty in things that many would consider valueless.

For those who are not interested, at the moment, in jade, Mr. Kraft's work provides a valuable lesson in a gentle philosophy which, if followed by all, would make the world a better place in which to live.



Henry Reider at his "bonophone"

## FOSSIL MUSIC

By H. P. Zuidema

When the tinkling melody of the gay "Merry Widow" waltz flows out of a room containing only the bones of bizarre, extinct animals of the dim past, it is time to investigate.

And investigate did a group of distinguished scientists, gathered recently for a national meeting at the

Walker Museum of the University of Chicago. They found, not a refugee from a name band playing a xylophone amid strange surroundings, but Henry Reider, of the Nebraska State Museum, playing his "bonophone."

Reider was not at all out of place, because his "bonophone" is made of pieces of the ribs of a long-extinct genus of American rhinoceros, a ponderous fellow named *Teleoceras*.



• *Teleoceras*, a Pliocene Rhinoceros

The rocks in which *Teleoceras* is interred are now exposed at the surface over wide areas of the Great Plains and prove that great numbers of his kind did browse over the low lands and wallow about in marshy areas in North America several millions of years ago.

The skeletons through which science knows *Teleoceras* show that he resembles a hippopotamus, although rhinos and hippos are not even remotely related. *Teleoceras* had an immense body and very short legs, as has the modern hippo. He also had a very small horn on the tip of his nose. Rhinos disappeared from our part of the world a few million years before the Ice Age, the last stragglers of the "American" rhino tribe dying off in Florida and California.

In 1926 a large number of bones of *Teleoceras* were dug up on the C. A. Quinn ranch near Ainsworth, Neb. One day, years later, Mr. Reider, who is now chief preparator of the splendid State Museum at the University of Nebraska, at Lincoln, was surprised to notice that the ribs gave out a clear, musical ring when struck. He chose 25 rib pieces which

were of no value for museum purposes and filed them down to proper lengths, so that each piece gave a different tone. Then he made the conventional stand for them, and has the most unique instrument in the world.

Reider soon was entertaining friends with his "bonophone" and they said he was good enough for the big time. The late Major Bowes heard about him and called him to New York to play over a national hookup. And Fred Waring said the "bonophone" has a better tone than any xylophone he had ever heard.

"But any old rib won't do," Reider explains. "They have to be well silicified. That is, the bone has to be replaced through ages of burial with silica contained in ground water, and the process has to be rather complete. For example, here's a rib of an ancient rhino from Texas. Same animal, same bone. But listen to the dull thud when I hit it. Now here's one from Nebraska. Listen to the ping! It has the stuff."

"Didn't your museum friends kid you when you were experimenting with musical fossils?" someone asked Reider.

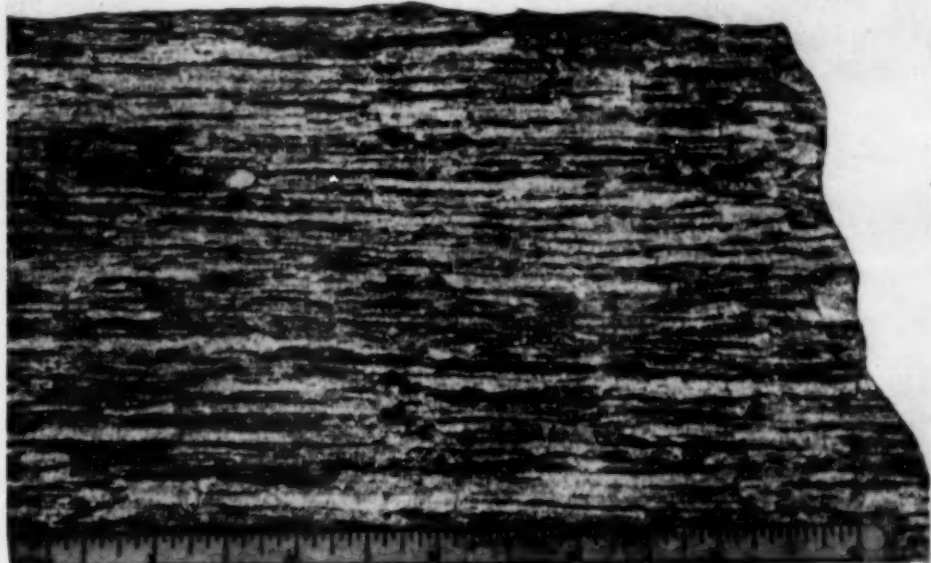
"Sure, and that's all right," Reider said. "There is a light side to our serious profession. And I can take a ribbing!"

(From Page 3)

Dear Sir:

May I take this opportunity to say that the series of "Elements of Geology" articles in *E. S. D.* is very interesting and instructive. I have been a subscriber from the first issue and have purchased some interesting material from some of your advertisers. My congratulations to Mr. Victor Shaw for his articles. Although most of the locales mentioned are several thousand miles from my home, I hope to some day visit the United States.

Roger Barnes,  
London, England.



Biotite Granite Gneiss, collected from Uxbridge, Massachusetts.

## ELEMENTS OF GEOLOGY

### Metamorphism

By W. D. Keller, University of Missouri

Metamorphism means change. When metamorphism is used in a geological sense it means conventionally a change in a rock through the agency of high temperature and pressure, aided by solutions and gases, while the rock is essentially in the solid state. If the rock were heated so that it became molten, the ensuing rock would have been igneous.

Glistening marble, or the varieties which show intriguing designs made up of bands, simple and contorted, spots, mottling, or bizzare patterns are examples of a metamorphic rock type which was typically recrystallized during the metamorphic process. By recrystallization is meant secondary regrowth of crystals, some at the expense of others, for crystals usually grow larger during this change. Marble is derived from limestone (or dolomite).

The original limestone may have been uniformly and monotonously

gray, consisting essentially of calcite with finely dispersed pigmenting impurities scattered uniformly through it. During metamorphism the calcite cleaved, dissolved, and recrystallized, at the same time rejecting from the newly formed crystals the abundant impurities. In consequence, the new calcite became relatively pure, clear or white, and the rejected impurities were segregated into spots or bands which were relatively rich in the pigmenting material. Each component was "purified" relative to the first condition of the rock. The metamorphosed rock is therefore a rearrangement of constituent segregations into interesting patterns from a monotonous original. Calcite and dolomite are highly susceptible to metamorphism because of their excellent rhombohedral cleavage which permits slipping from almost any direction (and easy re-welding), because of their high solu-

bility in any acidic solution, and because they can contribute their own mineralizer if brought to a dissociation condition.

Where appropriate elements occur in the proper proportions, slippery talc may form, or greenish serpentine which contributes to opicalcite. Silica in a dolomite may react to form tremolite or diopside. The possibilities are most interesting, for they always obey strict laws of physical or mineral chemistry. Marble is the outstanding example of metamorphism by recrystallization.

We should pause here for an instant to differentiate between true metamorphic marble and the unmetamorphosed sedimentary "marble" of the trade, which is actually a limestone having a desirable texture. The latter "marble" may be fully as serviceable a building stone as the one which has participated in the buckling of a core in a mountain range but we students will recognize the differences (recrystallization or not) between them.

Another result of metamorphism is the formation of a new mineral from one or more of the original minerals, with or without the addition of any elements possibly introduced. A classic example of this result is slate which has developed from shale. Let us trace the changes. Shale is a relatively soft sedimentary rock formed by the deposition and compaction of mud. It slakes and returns to mud when wetted — it would never serve as roofing material in a humid climate. It is composed of a clay mineral, perhaps illite or kaolinite ( $H^+Al^3Si^2O^6$ ), which usually carry more or less potassium (K) either adsorbed or located within their crystal framework. Through the agency of high temperature and pressure the elements of the clay and the potassium are brought into stable combination so as to form mica, commonly muscovite, a new mineral. The innumerable, microscopically

fine flakes of mica pressed tightly side by side in parallel orientation constitute slate which splits with remarkably good cleavage parallel to the mica plates. Slate then is a metamorphic rock whose essential mineral is mica in extremely fine, platy crystals. Mica does not slake in water, is relatively non-absorbent, and therefore slate serves as an excellent roofing material. Red, green, or black slates owe their colors to the presence of iron oxide, carbon, or other colored minerals which are accessory to the mica. The so-called "slate" in coal mines is not a true (metamorphic) slate — nor is it soapstone, another metamorphic rock — it is a hard, perhaps siliceous tough shale.

The slate cleavage in quarries is oriented commonly vertical or nearly so. This position logically follows because the metamorphism-inducing pressure is usually lateral, and the mica flakes of the slate grow with their long axes, or plate dimensions, at right angles to the maximum pressure. The original bedding or color banding in the shale may be preserved at a high angle to the cleavage.

If the mica flakes of the metamorphic rock are larger, consequently more lustrous, than those of typical slate, the rock is called a phyllite, and phyllites grade upward in crystal size into mica schists. In every instance, however, if the original rock was a shale, the change to mica was characteristically the formation of a new mineral. Many shales contain silica, dolomite, calcite, limonite, hematite, or possibly hydrated aluminum oxides like gibbsite, diaspor (or the rock bauxite) in addition to the clay minerals. If these are metamorphosed the various minerals may alter or combine to form metacrysts of corundum, garnet in its several varieties, staurolite, magnetite, andalusite, kyanite, sillimanite, pyrite, and others. Amphiboles,

chlorite, feldspars, quartz, graphite, hematite, and many other minerals may form. Always however there is order in the change, and definite limitations are imposed on the number and variety of minerals which may be formed under any one set of conditions. Where sodium bearing solutions enter, albite is generally developed in abundance.

The point to the previous discussion is that new minerals are developed from pre-existing ones during metamorphism. Brilliant glistening, hard, crisp ones may originate from soft, drab predecessors which bore each other almost no resemblance.

Metamorphism may be mechanical in category, and the original rock may be crushed, stretched, or strung out in a banded appearance. For example, nearly spherical boulders of a conglomerate may be stretched into beautifully shaped, essentially triaxial ellipsoids. Grinding and fracturing of the harder minerals is common.

Where heat effects are dominant a type of baking may take place. Baked shale, a sort of natural brick, or a hornfels may result from contact metamorphism of an argillaceous rock. Usually we are disappointed in the thinness of the metamorphosed zone or aureole about a dike, sill, laccolith, or other intrusive body, but when one evaluates quantitatively the temperature and heat necessary to change a rock, and the heat which is available in a crystallizing magma it becomes obvious that expectations of wide-spread contact metamorphism are unjustified. Where hot solutions are given off profusely by a magma the metamorphic effects extend much wider.

Quartzites develop from sandstones or conglomerates if silica cements thoroughly the original grains. Quartzites fracture through the grains as readily as around them. Under intense metamorphism adjacent quartz grains may indent each

other, and they may intergrow so that their contact surfaces appear as wavy as those of microscopic stylolitic seams, or as the suture lines where bones have joined and grown together. Regeneration, or growth by deposition of silica over old abraded, coated and stained surfaces is extremely common. The new silica on top is deposited in optical and crystal (space lattice) continuity with the original grain.

Think of the geologic history that may be involved here. A quartz grain from an explosive volcano may have been pitched into the air and landed in the fork of a tree where it was buried until the tree matured, fell and decayed. It may have been blown across an entire desert country into a marginal river. Then by river travel, and temporarily through the digestive tracts of mud eating animals, it may finally reach the sea where it was tossed back and forth across the rough sands of the beach, where the tides ebb and flow twice every twenty-four hours, until it was covered and became part of a sandstone. By this time it had been abraded, frosted, stained brown by iron oxide, and packed with innumerable other quartz grains having as diverse origins as any variety will allow. After deep burial the sandstone may have been involved in the folding of a mountain range and while being squeezed so terrifically that its crystal structure was strained, and heated so hot it was near an inversion point, solutions attacked it and deposited on it so that a metamorphic quartzite was formed. What remains — perhaps exposure to sunlight because the rocks above were eroded, the sand grain became a part of a boulder which a "rock hound" put under the back wheel of his car while it was parked on the mountain slope, and later picked up (who picks up rocks that he leaves in the road?) by the

"Missus" who wanted it for her rock garden or fireplace at home hundreds of miles away — and the sand grain lived happily ever after.

Gneisses are coarse-banded metamorphic rocks which contain feldspar. Many gneisses have the same mineral compositions as granites and are therefore called granite gneisses. The name does not imply that the gneiss came from granite. Schists are thin-banded metamorphic rocks, and are characterized by being composed typically of thin platy minerals like mica, chlorite, talc, specularite, graphite, or needle-like tremolite, actinolite, or hornblende, which are relatively stable under the conditions of metamorphism.

An earth scientist may infer the degree of intensity to which rocks were metamorphosed by determining the minerals produced. Chlorite, sericite, epidote, and albite are indicative of relatively mild, or "low-grade" metamorphism, but biotite, hornblende, garnet and staurolite characterize moderate or "middle-grade" metamorphism, and the intense or "high-grade" metamorphism produces sillimanite as an index mineral. Rocks which have been strongly metamorphosed may be conditioned later by an environment of less severity and a lower grade of metamorphism be superimposed upon the earlier metamorphic minerals. This effect has been called retrogressive metamorphism.

In a broad way, metamorphism has been divided into dynamic or regional, and contact or local varieties. Contact metamorphism occurs at the contact of an igneous body and beyond, into the surrounding rock, and is effected largely by heat and solutions. Dynamic metamorphism involves significant movement along with high temperature and solutions. It is almost impossible to artificially pigeon-hole natural phenomena like metamorphism. It is

likewise impossible to ascribe solely a single agent, effect, or result of metamorphism to the formation of a particular rock or structure.

The high temperature and heat which induce metamorphism come from the internal heat of the earth, radioactivity, chemical reactions, magmatic heat, or local frictional heat. Lateral pressure is the dominating one in effectiveness. Solutions and gases which catalyze or "mineralize" the metamorphic changes come from magmas, connate water, or combined and gaseous elements.

Metamorphism restores, or puts into reverse, the work done by weathering. Which is the more fascinating or spectacular depends upon one's viewpoint — most of us are interested in both processes.

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## FAMOUS LOST MINES

— A Series —

Victor Shaw

(2)

### THE LOST PEGLEG SMITH

In this second of our series of lost mine stories, we are giving all that is known about the long and terrible trek made by the so-called "Pegleg Smith" up through the southern California desert, in the year 1853. His full name, like his past history, is unknown; and this tale merely describes how, with Lady Luck perched upon his shoulder, he chanced to stumble upon his everlasting fortune. Then, with her good deed for the day well done, the dame in question blithely flew off to attend to whatever other business she had on hand.

And at this point according to the record, Smith thus left to his own resources made the biggest mistake of his life, by keeping on over that super-heated sandy waste toward his original objective. Of course, he was a cripple for he'd lost a leg during a mix-up with the Indians, while crossing the western plains quite a few years before; but that is no alibi for his rash decision to stick to his hazardous journey, on which he came close to losing his life. He was supposed to be desert-wise, and should have known better. But, he did keep on, to eventually wind up at the tiny desert outpost of Mohave, with some \$10,000 of black-gold ore tucked into his saddle bags. But we'll let Smith in his own words tell how he found this deposit, and how he lost it, thus placing it in the category of famous lost mines.

Lost mines? But, you say, how on earth can such a valuable property actually become *lost*? It seems incredible. Well, maybe so, to anyone not familiar with the trackless mazes of canyoned mountains, and the end-

less expanse of our desert regions. They are immense areas, where the shaggy hills and rolling sagebrush dunes all look alike, and where usually there are no outstanding landmarks by which to recognize any given spot a second time. Those who have happened on some camping trip to lose themselves can understand how easily it may occur.

As a matter of fact, the reasons behind the loss of such mines are many and varied. Locations of some were kept secret by intention, for if staked and recorded with the required full description, it would be sure to start an undesirable stampede. Then, maybe the discoverer is an alien and cannot stake a legal claim; in which case, like Jacob Walz, the "Dutchman", he must keep its location secret in order to work his rich discovery unmolested. In such cases, should anything accidental or lethal happen to the miner who alone knows the location, his mine thereby is placed on the list of lost mines. And many early Spanish mines worked in our Southwest were abandoned due to attacks by Indians, and in the course of time were covered by earthquakes, or landslides, or like the Peralta mines by the Indians themselves. So, it is not surprising that so many of these lost mines stay lost.

Beside all this, there always is the fact that when the tales are told and retold they become so distorted, particularly in the details of location, that relocating them is practically impossible. It is true enough, however, that a few of these lost bonanzas may have connecting events to make them seem true — as is the case in this "Lost Pegleg Smith" ac-

count, where two such incidents can be mentioned.

Now in this Lost Pegleg Smith story, not only must the foregoing discussion be kept in mind, but also the fact that after making his remarkable discovery he couldn't remember where he went, nor how he got to Mohave, which was off his course and too far north. Yet it is natural that he shouldn't, for he had never been in this part of the country before. In addition, after he'd found the black gold ore, the hardships of the desert trails had left him sorely confused, with his memory too impaired to be able to back-track himself to that spot, or to direct others to it with any accuracy, although he tried.

All he knew was that the gold was no dream. It was a rich, heavy solid fact. He could picture the place where he picked it up, all right, and it still would be there. All he had to do was spend a while hunting, and he'd be certain to find it again. But time ran out on him and everyone else. Today the rich find still is there waiting.

At that time, of course, a discovery like this was destined to get plenty of publicity and it certainly did; but, unlike that of the Lost Dutchman Mine, this story appears to have been circulated for the most part among local prospectors and miners of southern California. But, however that may be, from all we can learn this story seems to be one of the most authentic of them all. Not only is Smith's own account reported more or less accurately, but in succeeding years there have been two notable incidents recorded which appear to corroborate and verify the story he told those who took care of him at Mohave.

The first of these incidents is said to have occurred about 1893, some twenty-five years after Smith died in California. Prior to this, all the desert area from Mohave southeast

to the Colorado River had been combed and re-combed in the search for the Pegleg bonanza. Not only by those who saw Pegleg's gold at Mohave and the hundreds who got the news later, but Smith himself constantly searched the desert until his death in 1868.

But all the hunting was in vain. Nothing was found, so due to repeated failure general interest dwindled until only a few of the die-hard prospectors continued doggedly to explore every portion of the almost limitless expanse of the California desert. Then, one day in 1893, a prospector appeared with the news that he had found the "Lost Pegleg Mine", and he had samples of the same black-gold ore to prove it. Unfortunately this prospector fell ill, before going back to mine his discovery, and he is said to have died without divulging its location. There is no record of his name, nor where he died; the only fact in the vague tale being the samples he brought back.

That was over a half century ago. But twelve years later, in 1909, came the second incident to which many still living may attest; a colorful event, which again hopped up local interest to the possibility that this rich Pegleg Smith deposit still might be relocated.

At this time the Southern Pacific Railroad had a large crew employed on maintenance work along its right-of-way in the Imperial Valley, between Salton and Ogilby. This region which used to be known as "the spot nearest hell in the United States", was by this time being irrigated by water from the All American Canal brought down from the Coachella Valley, and was rapidly growing into what now is the best year-around truck-garden spot in the State.

But in 1909 this was just starting and one section crew was repairing track near the water tank at Glamis,

when the event mentioned occurred. It was one of the usual terrifically hot summer days, when the white hot sun blasted all the desert around them, and sand devils marched in their twisting dance before gusts of super-heated winds.

All at once the section hands spotted a dim figure approaching through the swirling sand clouds and paused to watch it. It was coming from a low Pass in the Chocolate Range to the eastward, gradually drawing closer and more distinct as it plowed toward them through the foot clogging sand dunes, until presently they identified it as a closely blanketed Indian squaw. Seeming to pay no attention to them, she headed straight for the small overflow water tank on the ground.

Bent and staggering with open mouth gasping, she seemed to be about to collapse from thirst and fatigue. She was carrying some sort of bundle, which dropped as she gripped the dripping edge of the tank and plunged her whole head into the cooling water.

She appeared so weak and exhausted, that several of the crew started running to her assistance. She saw them coming, lurched frantically to her feet and apparently too frightened to grab her bundle waddled back the way she had come as fast as she was able. They followed a short distance, but gave up the chase and went back to the tank, where they picked up and examined the bundle she had dropped.

It proved to be a dirty ragged piece of blanket tied securely with a curiously knotted length of rawhide thong. Slashing the thong with a pocket knife, they unrolled the blanket and stood amazed at its contents. It held nothing but a lot of black fragments of rock, dozens of them, varying in size from a boy's marble to that of a walnut. And all of them, when jabbed with the knife, showed the yellow glint of pure gold under

the surface film of jetty black. It was the same, some then recalled, as the fabulous "black gold" found by Pegleg Smith.

Much excited, some proposed to follow the squaw and question her, but by this time she was lost in whirling sand clouds near the Pass and their foreman appeared and ordered them back to work. Later, when the section foreman turned the black nuggets over to the manager, who had them assayed, their value proved to be nearly \$2,000.

Of course, when the news broke of this unique incident, the desert around Glamis sprouted a huge crop of prospectors and tents as if by magic. Again a stampede was in the making, for everyone was convinced that the squaw's black gold gave a definite clue to the legendary lost Pegleg mine. The gold hunters swarmed all over the Chocolate Range and surrounding desert hills for months; but, as before, the excitement gradually died out, when nothing was found that complied with Smith's description of the site of his discovery.

The Chocolate Mountains, like other ranges in this portion of the California desert, are composed of igneous eruptive rocks intruding pre-Cambrian metamorphic sedimentaries. This is a formation most favorable for gold and other ores and there are many such in this region; some of them including the Pinto, Eagle, and Chuckwalla ranges lie in the probable route Smith took to reach Mohave. Hence the supposition that his black gold deposit lies somewhere in this neighborhood is not unlikely, though the many black hills badly handicap a prospector.

Also, most of these desert mountains, especially the Chocolates, have little or no water; which makes prospecting a tough job, and if ore is found prevents mining, if capital is lacking to install drilling equipment to furnish adequate water for min-

ing and milling. A few natural wells and tanks are now mapped here and there, but the only permanent water known in the Chocolates is the "Beal Well", in a canyon at the northern end of this range.

Yet the incidents mentioned serve to verify the story Smith told in 1853, at Mohave, with its three saloons, two stores, and some weather-beaten shacks, material for which were hauled from distant towns. It's recorded that the Mohave residents said that Smith's saddle mule brought him in, otherwise he would never have made it; for he was about all in from thirst and lack of food, and so weak from heat prostration that he couldn't walk a step. His lips were black, cracked and bleeding, tongue dry and swollen, and could barely see from desert blindness.

But the old-timers took good care of him and saw to it that he lacked nothing, while he lay in bed for weeks slowly recovering and always tightly gripping his heavy saddle bags, that had been brought to his room in one of the empty shacks.

One day, when partially recovered but still too weak to walk, Smith opened the bags and showed his treasure. The saloon and store keepers and prospectors crowded around his bed, and excitedly examined the black gold ore, the like of which they'd never seen before. And, the question they kept asking was, "where in hell 'd you get this?"

It is said that at first he was caged and stalled them off, although he talked freely of himself and where he had been. According to his story, he had for some years lived with the Cocopah Indians on their reservation along the east side of the Colorado River north from Yuma. Across the river to the west rose the dim blue Chocolate Mountains, but eastward lay the wide-spread desert, mile upon rolling mile of wind-blown sand dunes mantled with

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chapparral and cactus and swarming with rattlers, scorpions, and tarantulas, all scorched by the blazing white hot sun by day, though chilly enough at night.

It was a region the Indians seemed always to shun, not only because there was no water, but because their god of fury often blasted them

with blinding sand storms when they dared venture that way. It was the same, they told Smith, west of the river beyond the high black hills. But after Smith had lived some time with them, an Indian boy for whom he had done a favor told him the real reason behind this:

Devils guarded these black hills, and they blew the blinding sand clouds to choke and bury all who came near them; but, long ago, a Cocopah scouting party had found some pretty black and yellow stones on one of these hills and brought them back. The stones were too soft to make arrow points, but white men liked them so much they traded good food for them. So, when the tribe needed grub, the Chief sent men after them, crossing the river at night, so the devils could not see where they came from. Then they scraped the black paint off the outside, and traded them in white towns for what they needed.

Suspecting this was gold ore, Smith kept alert and one dark night watched a small party of Indians swim their ponies over the river, and ride quietly toward the west. In less than a week they returned, and for the gift of his pocket knife, the Indian boy stole one of the stones they brought back. It was a nugget of pure gold coated by a strange black film. He'd never seen anything like it, but it was so rich that his excitement rose to fever pitch to find and stake it.

For a long while Smith tried to wheedle the Indians into telling where they got this gold, but they merely stared at him poker-faced and stalked away until in the end, he gave it up as useless. But he'd noticed that when reaching the California river bank, the Indians had headed northwest through the foothills toward the desert beyond, so he decided that he knew enough to locate the place himself. But, with only one serviceable leg, he would

need a partner, and a friend he could trust lived in Los Angeles, so he resolved to go there and get him.

Now, Smith had no map, for in 1853 none of this region had been surveyed, but he'd heard in Yuma that the City of the Angels was near the Pacific coast some two week's journey to the northwest. His saddle mule was desert-wise and he had big saddle bags and canteens, that he had used on previous journeys over western plains. Now it is well known that, afoot or in the saddle, all desert travel is extremely hazardous, particularly if the traveller is alone and the journey undertaken during summer months. Considering Smith's past experience, it seems improbable that he didn't know that winter months are safest, as weather is cooler and desert wells and washes have more water. However, it is not on record what season of the year he made this journey, only that he outfitted in Yuma or Laguna and set out to get his partner.

The range now known as the Chocolate Mountains extends northwesterly some seventy miles, from a point across the river at Laguna, up along the eastern side of the Southern Pacific right-of-way and the present All American Canal. Probably Smith started out along the west side of the Chocolates, for the Indian party had gone that way and the eastern route would be out of his way and much longer. Nor does the story he afterward told in Mohave mention this point. We only know that the squaw with her black nuggets came from the Pass, some fifty miles up this range, and apparently from its western side.

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At any rate, after Smith had ridden for several days out into the desert, he became much confused about the direction of the route he was taking. He was blinded by the white hot sun. The whirling dust devils kept blasting him with clouds of fine sand, that dried and cracked his lips, and dancing heat waves with the desert mirage had him wondering if he wasn't bearing too far one way or the other.

So, he halted beside a nearby high black butte, hitched the mule to a big convenient boulder, and stumped up its sandy slope. At the summit, which he estimated was some twelve hundred feet above the desert floor, he had a good view all around him and for miles ahead.

"When I got on top," he later told the Mohave miners, "I seen a little ways off there was another black hill, like the one where I stood and about as high, that was joined on to my hill by a low saddle that made them one hill with two peaks. The hill was off by itself. I couldn't see any other hills or mountains, but the main range. Anyhow, I figured out where I'd got to go and went down to get my mule. Took me some time too, with my peg sinking deep in the sand every step.

"Well, I was sure glad I'd tied that Long-Ear good and tight, as he had all my water and grub to last a week or so. The sunuvagun got milling around, while I was up that hill, and had stomped around plenty and twisted the rope all up too. And it was while I fixed his rope, that I found these nuggets. I'd noticed there was a whole lot of black cobble stones scattered around, but now I saw that while the critter'd been churning around that way, his shoes had gouged the black off of a lot of them, so they was all streaked with bright yellow. So I picked some up and devil take me if it wasn't solid gold.

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"Yes sir, the pure quill, and the ground all around the foot of that hill was plumb covered with all kinds of that black gold ore. Reckon I went plumb crazy there for a while. Anyhow, I know I kept picking 'em up and then dropping 'em, to get other chunks a little bigger, till at last I kind of come to myself. For, all at once, I knowed I'd stumbled onto the very place where them Injuns got the black gold they'd brung back to the reservation that time. It was the same stuff!"

And right here, as has been mentioned, is where Smith made his fatal mistake that came close to costing him his life, though it did result in the loss of this rich gold deposit. There is only one way to account for it: that his confused state of mind, coupled with the stunning effect of his dazzling discovery, so befogged his brain that he forgot that this desert journey was merely to get his partner, to help hunt for the very deposit he'd just found — or one just like it. His reasoning faculty must have been atrophied, or he would have realized that he need go no farther; that, after staking this claim and putting up a stone monument so large that he couldn't miss it, he could go back to Yuma and record it, and outfit to return and develop his find.

But, instead of following this sane course . . .

"Anyhow" — he went on, to his bug-eyed audience in Mohave, "I knowed I had a heluva long tough ways to go yet, and wasn't fool enough to chuck any grub away to

(To Page 32)

## FOR PALACE AND HOME

By Eugene Nelson

Gypsum is a chemical compound of calcium and sulphur. There are deposits of this mineral in nearly all countries, and there are great deserts of it in our own Southwest. These deposits were formed during the past ages by a rather complicated process. Most rock masses contain pyrites — commonly known as “fool’s gold” — which is a combination of iron and sulphur. Rain falling on the iron pyrites forms sulphuric acid which seeps down into the ground and strikes the rocks lying beneath the surface of the earth. In case this sulphuric acid comes in contact with limestone — which is made up of the element calcium — a reaction takes place resulting in the formation of calcium sulphate, or gypsum. Since both limestone and iron pyrites are common minerals, this accounts for the widespread deposits of gypsum.

Gypsum forms in crystals that contain quite a bit of water. Scientists refer to this as the “water of crystallization”. This water content is very important in certain of the uses to which gypsum is put today. Usually the gypsum crystals are fairly large and so soft that they can be scratched with the thumb nail. Sometimes, however, chunks of gypsum are found in which the individual crystals making up the whole mass are very tiny and closely packed together. This gives the rock a satiny appearance and so the resulting mineral is known as “satin spar”. Many minerals have this word “spar” as a part of their name. “Spar”, however, is merely a term used by miners to indicate any of the non-metallic minerals in general. In light of this, then, “satin spar” becomes merely “satin mineral”.

When gypsum is extremely fine grained, it becomes that material which for ages has been used by poets to indicate the whiteness of their lady-loves’ brow — alabaster. For ages, too, alabaster has been highly prized as a material from which to make statues, vases, and other objects of art. Sometimes alabaster is pure white; at other times it is veined and tinted with blue, pink, and other hues. Since alabaster is a rather soft material, it is easily carved. This feature added to—rather than subtracted from—its popularity as a material for statuary in the olden times when tools were mainly of copper or bronze. Many of the temples and palaces in by-gone days owed much of their beauty to the alabaster statues that graced their halls, and to the white plaster made from the more common form of gypsum.



A gypsum processing plant, located at Plasterco, Virginia. The mine head-frame can be seen in the right center. (Courtesy Bureau of Mines, Department of the Interior).

Ordinary gypsum becomes especially valuable to industry after the stone has been heated in the presence of air — or “calcined” as the engineers call it. Today, most of the gypsum is mined, crushed, and calcined all at the same location. The chunks of rock, as they come



Dragline scraper for removing the 50-foot overburden from a gypsum deposit at Fort Dodge, Iowa. (Courtesy Bureau of Mines, Department of the Interior).

from the mine, are passed into huge grinding machines that are enclosed so none of the dust will get into the surrounding air. Rock dust is extremely harmful to the lungs of the workmen.

From the crushers, the powdered rock is poured into gigantic kettles that are twenty feet wide and tower even higher than that into the air. These pots are heated from below — just like a kettle on a kitchen stove. As the powdered gypsum hits the hot bottom, the rock begins to boil for all the world like hot soup, bubbling at the top of the mass as its water of crystallization is evaporated off. The gypsum is heated until it has lost approximately three-fourths of its water content. The kettle's bottom then swings open and the hot

stone powder flows through pipes to the "tube mill".

The tube mill is made up of large revolving steel cylinders full of steel balls. The rolling, tumbling balls soon reduce a charge of gypsum to a very fine, white powder. In this state it is known as "plaster of Paris" because for many years the world's supply of it came from the huge gypsum quarries that are located north of Paris.

When water is added to this powdered gypsum the mineral soon re-crystallizes — or "sets" — into whatever shape has been given it. It becomes a hard, rock-like, fine grained mass because it has actually been transformed back again into the rock it was before it was calcined. Plaster of Paris is important in making all kinds of casts and molds, such as those surgeons use for helping broken bones to set properly.

Cattle and goat hair is added to the calcined gypsum that is to be used for building plaster because the hair has been found to help hold the plaster together. Another chemical is also added which keeps the plaster from setting too soon. Because of its water of crystallization, gypsum products make excellent fire-proofing materials. A block of molded gypsum is something like a cake of ice. When a fire is placed on one side of a cake of ice, the other side stays cool until the entire block has melted. In a like manner, gypsum wall plaster cannot be destroyed until all the water has been driven out of it — and as long as the water of crystallization remains, the wall temperature cannot rise above the temperature of boiling water, or 212° Fahrenheit.

The five million tons of gypsum mined annually in the United States in ordinary times, however, have many other uses besides the obvious one as plaster. Glass makers use tons of it in the manufacture of plate glass. Ordinary panes of "window"

glass are set rigidly onto iron tables by means of Plaster of Paris and then are polished on both sides with sand and rouge. This operation imparts the high sparkle and clarity characteristic of plate glass. Farmers also use gypsum as a fertilizer. When gypsum is sowed on a crop of clover, the clover is enabled to take more nitrogen out of the air than it could otherwise. Then, when the clover is plowed under, it releases its valuable nitrogen content and so enriches the soil.

Ground-up gypsum is used in paints; and it also is added to rubber products to make them harder and more durable than they would be if composed of pure rubber. The chalk ordinarily used in schools is not natural chalk at all, but is composed of gypsum molded into sticks. One of the latest uses for this versatile mineral is in the motion picture business. Piled into heaps or drifting along on the wind generated by the wind machines, powdered gypsum gives a perfect imitation of snow and literally tons of it are used every year for this one purpose.

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Fossil bones of the Pleistocene (Glacial) Era of 20,000 years ago being systematically recovered as a by-product of Alaskan gold mining, an estimated 40 tons of bone and tusks having been sent to various museums in the states in recent years. Water under high pressure is used to thaw and tear down the gravel beds and when fossil beds are spied the nozzles are turned off and the bones carefully removed. Bones of small animals are lost, however.

Bones of mastodons and large hairy elephants are common. The best find, made near Nome, was the entire skeleton and part of the hide of a great bison.

The University of Alaska is actively assisted in the salvage work, particularly in the person of Mrs. Eunice T. Collins, curator of the University museum. The museum lacks facilities for reconstruction of the skeletons but has retained examples of all the different pieces of bones removed.

The University has also made numerous archeological expeditions in the territory and from the many Eskimo relics obtained, Mrs. Collins believes that at one time, about 2000 years ago, there was one homogeneous Eskimo culture existing from the Bering Sea to Greenland.

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## Which Camera For The Earth Scientist?

W. D. Keller

"What camera did you take that picture with?" is the question so commonly asked when an interesting or inspiring beautiful photograph is shown. Earth scientists are asking what camera to use in order to capture and take back home that wonderful view of the mountains and cottony clouds, a picture of the prize collecting locality, or a record of the geological occurrence that defied immediate explanation. The long, brilliantly lighted days, warm weather, and vacation times ahead are making us "shutter happy" so here is some camera advice based on considerable experience in taking landscapes and geological views.

We might choose to start with the expensive cameras, the big ones or the miniatures, but after all is said and done, more people employ the "point and snap" technique using a small folding or box camera than with any other, so it will be most helpful to start with the simple models selling for ten dollars or less. My advice to purchasers of this type is to get one not smaller than  $2\frac{1}{4} \times 3\frac{1}{4}$  inches (120 or 620 size) because you will rely mostly on negative size (contact print) pictures. Negatives taken with the fixed focus lenses, the usual equipment on the inexpensive cameras, ordinarily do not make clear enlargements more than two times, or twice the negative size.

By fixed focus lens, is meant that the lens is fixed in position at the factory. Usually it is set to give a sharp focus of objects about 30 feet from the camera, but its depth of field is sufficient to give reasonably sharp images of objects ranging from those about 10 feet away to those very distant. The shutter "snaps" (opens and closes) at a speed usual-

ly between 1-25 and 1-50 of a second, and the "f" speed of the lens is probably about 11. Therefore, all of the mechanical and optical adjustments are effectively compromised in manufacture to register a satisfactory contact print picture from a negative of Verichrome, Plenachrome, or Superchrome film when taken in bright sunlight. Fast panchromatic film permits good pictures to be taken under dimmer illumination. My only further advice to the buyer of this camera, as well as to those of all other cameras, is to check the sharpness of the image with a ground glass as outlined later in this article and to hold or set the camera on a steady support whenever possible.

To capture beautiful cloud effects against a darkened sky one should use a filter of some sort and this practically requires that a lens element be outside the shutter. This brings us to the folding models costing up to about \$50. Included here are those taking pictures  $2\frac{1}{4}$  inches square (12 pictures on a 120 or 620 roll) and larger. In this price range one usually obtains a camera equipped with lens that is adjustable to the object distance from the camera, a diaphragm opening to about f:4.5, and a shutter with speeds of 1-25, 1-50, and perhaps 1-100 second, besides time and bulb. Ansco, Eastman, Argus and some other makes are satisfactory buys in this price bracket. When you put that much money in a camera I recommend buying a case to cover it if you take it on outdoor trips.

With such an investment you owe it to yourself to check the focal adjustment of the lens. I know from personal experience that cameras

costing several times this price have had their lenses jolted out of distance adjustment in shipment (or in the owner's auto) and I always check my cameras periodically and when purchased. To do so, open the diaphragm to widest aperture, open the shutter, set camera on a solid support, and point toward an object with fine detail (like posts, spire, narrow cornice) 300 feet or farther away. Then hold a frosted glass with the frosted surface in place of the film on the rollers or guides over which the film travels, and observe the image detail while adjusting the lens to "infinity". The image should be razor sharp when the lens is at infinity, but should become unsharp when the lens is moved back or forth from infinity. If your camera does not meet this test, give it back to the dealer, or if you are a "fix-it" personality, give it the works yourself. You may want to check the focusing scale at the near distance, usually 6 feet, but ordinarily this is calibrated all right if the infinity adjustment is correct.

To get cloud effects you may slip a sky filter (half of the glass colored yellow) over the lens and shoot your picture. Most camera fans buy a K-2 solid yellow filter which covers the entire lens area with color and requires twice the unfiltered exposure with panchromatic film, or 5 times the unfiltered exposure with the orthochromatic films named above. To double the exposure time you may either (a) open the diaphragm one "stop" (like from f:16 to f:11) or (b) slow the shutter one-half, as from 1-50 to 1-25.

My next class includes the camera that I recommend as the best overall compromise for the serious earth scientist. I refer to the Recomar (Eastman) or Maximar (Zeiss) type film pack camera which is equipped with double-extension bellows, a good lens (about f:4.5 wide open),

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(From Page 21)

and a good shutter which gives you all the necessary speeds. It has an eye-level wire frame view finder and a small lens-reflector viewer used when the camera is held at waist level. With the bellows extension a near-view photo of almost natural size can be taken. The ground glass is put in place of the pack adapter for critical special focussing, and this is done in bright light. Both wide-angle and telephoto-effect supplementary lenses can be slipped over the regular lens to let you take the wide side of the valley (wide angle) when you haven't room to back up, or to "bring closer" the distant mountain peak (telephoto) like a field glass does for the eye. Many of these cameras have a delayed action shutter which enables the taker to run out in front and get into the picture also. Film packs may be unloaded (in the dark room) one film at a time so you do not have to wait until the whole roll is exposed before you develop your picture.

If you use lantern slides the  $2\frac{1}{4} \times 3\frac{1}{4}$  size will utilize the entire negative on a regular, large-size lantern slide, but the  $3\frac{1}{4} \times 4\frac{1}{4}$  or the  $9 \times 12$  cm. size (which also takes a  $3\frac{1}{4} \times 4\frac{1}{4}$  film with adapter) will be cropped a little all around when printed contact. Color film is available for these cameras, but it is quite costly for the average amateur. If you want

to take color transparencies I recommend the 35 mm. size which is discussed later. If you do not do your own dark room work and do not plan on having many enlargements I recommend the larger size. Because I do my own dark room work, and need to economize on weight in the field, and on expense for film, I prefer the  $2\frac{1}{4} \times 3\frac{1}{4}$  size for my personal use. With the present day, high quality film one can set his lens diaphragm at f:11 to f:16, and take a negative that will develop out and enlarge from  $2\frac{1}{4}$  to  $3\frac{1}{4}$  to  $11 \times 14$  and larger without much trouble.

For outdoor scenes I like to use Plus-X, Super Plenachrome, or Supreme film. Some persons use the double or triple X pan types for everything, but my personal preference is the faster pan film only for artificial lighting. I do not get the sparkle and brilliance in landscapes with the faster film that I do with the 3 named above.

Put a K-2 yellow filter on in front of the lens when you want to increase contrast in most landscapes, or to hold back the blue sky so that white clouds show up. A K-2 filter gives normal correction but a slightly more dramatic contrast of dark and light (slightly over corrected) is had by using the slightly denser K-3 filter. The old Agfa No. 4 yellow, with a very slight greenish tint, was a very useful filter. For special purposes a Polaroid filter is useful, and for very dramatic effects a dense G or a red A can be employed. These are for the advanced amateur, and the beginner had better start out with a K-2 or K-3, for he will use that one more than 90 per cent of the time anyhow.

A film pack camera can be adapted to roll film by soldering the back of a (discarded) roll film camera to an extra film pack adapter which is then slipped into its regular position on the pack camera. It will be necessary to attach a supplementary

focussing scale on the camera floor to adjust for the depth of the roll film back. The writer took pictures for almost an entire summer with such a home-made device when roll film was available to him but film packs were scarce.

With a camera of the Recomar type, one can take normal views, close-ups of minerals and fossils, portraits, wide angle, telephoto, nearly natural size, color, lantern slides, enlargeable negatives, fast action, self-pictures, and can even do a little photomicrography or copying work. The contact prints are large enough to please if one does not care to enlarge. You see why the writer recommends this camera for the all-around use of the earth scientist.

Now, if you buy a camera of this type you are probably serious enough in the hobby to gain by using an exposure meter. Certainly if you take *color* photos under all conditions usually met with by earth scientists: in brilliant sun on land, water, or snow, in deep shade of a pine forest with overcast skies (and you may never return here for another chance), in deep canyons or high mountain tops you *must* use a photoelectric exposure meter. I recommend one for black and white pictures also, and use one regularly. If your camera is in good condition, your film under the expiration date, and you expose by the proper direction of a photoelectric exposure me-

ter correctly used, you *will bring back a photo*. It isn't luck any more.

As for exposure meters I prefer a Weston Master, probably because I started out with a Weston. A friend of mine has a G-E and when we go out exposing film we get exactly the same readings so there isn't much to choose between them (some like blondes and others brunettes). I hear that Skan is good but I have no first hand experience with it.

The reflex cameras are of two types, the single lens Graflex type, and the double lens or Rolleiflex, Argoflex, etc., type. These cameras have the advantage of permitting you to see right up to the instant of taking, exactly what you are taking. You focus the image sharply and compose the picture exactly as you want it. These features are powerful advantages. About the only criticism voiced toward the Graflex is its bulkiness for some foot travelers, and the fact that the lens opening is very small for bright vision when photographing in brilliant sunshine. Now that most news photographers have traded in their old Graflexes for Speed Graphics, some fair buys may be had in used Graflex cameras. This writer has used one and likes it, but it is too bulky to take on any hikes with him.

The double lens reflex cameras have a viewing lens and a taking lens. You see before you in actual picture size, in the same focus as on

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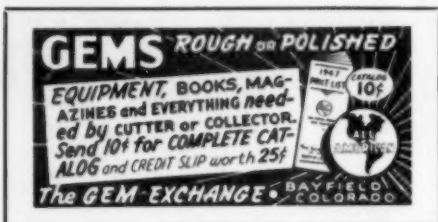
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the film, the entire picture image *all* of the time that your film would "see". The viewing lens is always wide open, which is an advantage over the Graflex type. Many pictorial photographers prefer the twin-lens type because they can effectively compose their pictures before taking them. Possible disadvantages of this type camera are that it is restricted to the use of roll film (not single developments of packs or cut film) and that the sizes are pretty small, usually  $2\frac{1}{4} \times 2\frac{1}{4}$ , for contact prints. If you do your own enlarging you may prefer the twin lens reflex type over all the cameras. It does not seem quite as versatile to the writer as the Recomar type but from the standpoint of picture composition it is preferred. The Eastman and Argus reflex cameras are capable of rendering very fine pictures.

Some of our "minicam" enthusiasts will have resented the delay in coming to the 35 mm. group. The advantages of this group include portability, low film cost per exposure, great depth of field (focus) of lens, economy with color film, and available fast "candid photo" lenses. The disadvantages are the small negatives which make somewhat costly enlarging almost a "must", the necessity for fairly accurate exposures, the practical difficulties in retouching or intensifying a negative, the prominence of fine scratches or dust on the negative when enlarged, and the high cost of a really good 35 mm. camera. To get first quality pictures from 35 mm. equipment

you better plan on spending not less than \$75.00 for the camera. In exception to this statement I think of the old, low-priced Argus which did a fair job with black and white, and gave beautiful, slightly soft color effects with Kodachrome. A slight unsharpness with color actually enhanced the pictorial effect of the picture. No doubt there are other exceptions, but as a general rule I would expect to pay a real price for a good 35 mm. camera.

I will not dwell on the versatility or many advantages of a Leica, Contax, or Exakta. The person who uses one of these effectively has probably acquired enough photo experience that he does not need to read this article. Such brief dismissal does not mean I am down on the miniatures, for I have used, back from the *low-priced* camera days, two Leicas (one for color, the other monochrome) with supplementary lenses, photomicrographic attachments and various other gadgets. If I were forced to choose only one camera for my use in monochrome and color I would choose my Leica, so it would be apparent that I am not prejudiced against 35 mm. minicams. If I did not want to take color and minimized enlarging, I would choose a Recomar type. Those preferences apply while working as Earth Scientist; for other purposes I might choose a reflex type, a Speed Graphic, or some other model.

I recommend that a serious user of a 35 mm. camera do his own fine-grain film developing and enlarging. You can get wonderful results but those pictures of excellence usually mean precision work all along the line and individual attention to the finished product. For regular work I generally prefer Panatomic-X film (also Dupont Superior No. 1 when available), develop in Ansco 17, and print on Velour Block or Kodabromide No. 2 papers. Some enthusiasts

(To Page 28)

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(From Page 26)

will say that the borax developer is not really a "fine-grain" developer but when I use a matured solution (after 2 or 3 rolls have been developed in it and replenisher added) and keep my short stop, fixer, and wash water within fairly uniform temperatures, I make 11x14 enlargements without objectionable grain. I get more brilliance, depth, and tonal quality, compromised with absolutely dependable, uniform, non-erratic, and reasonably fine-grain development with the Ansco 17, or D-76, than with other specially prepared or "trick" developers. I develop film in field camp or hundreds of miles from a dark-room at home and I can depend on that developer.

By and large, No. 2 contrast paper will give the best prints if negative contrast is not too far from normal. By varying the concentration of the developer (I like D-72) some adjustment to negative contrast can be made.

Now for some general tips. You can find in many camera shops some good used buys in the old Eastman post-card size roll film cameras which have good quality anastigmat lens at f:6.8 to 7.7, and serviceable shutters. The original film expense is a little high but you do not have to enlarge the photos, negative defects can often be corrected if desired, and the final, net cost of a bunch of good pictures, big enough to see, show, and publish will be less in many instances than those originating from 35 mm. negatives which cost only 1½ cents each originally. Also, do not overlook the possibilities of the used Graflex market if you are willing to compromise a little bulkiness on your photo trips for a really high grade, first class, proven used camera. Parenthetically, news photographers say that the Speed Graphics "have every



thing" — for news photographers, but they are a little bulkier than the Recomar type and I prefer to sacrifice some of their features not so essential to geological views for the portability of the Recomar type.

Use a tripod or other rigid support everytime possible when taking a picture.

Tell yourself when you have a good camera loaded with fresh film that the weakest link in the chain to highest quality pictures is the operator behind the camera. I mean that statement absolutely. Taking photos, views, etc., is a science on which you can rely, but *making pictures* is an art. This writer discovers too frequently that he is not an artist, but the efforts are lots of fun—to you, best wishes of sharp images and happy shooting.

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### William's Quarry Closed

We are sorry to report that the William's Quarry in Easton, Pennsylvania has been closed. The rock has been quarried to the limit of the land owned by the C. K. Williams people and they are going to secure their filler material elsewhere. This writes *finis* to a famous mineral locality as far as finding new mineral specimens is concerned. One of the unusual minerals that this quarry produced was thorianite. This mineral has not been recorded from any other locale in this country. Other minerals found at the William's Quarry were: carnotite, gummite, autunite, talc, serpentine, tremolite.

### COVER PHOTO

Five dollar first prize in this month's cover photo contest goes to Anthony Thurston of Swansea, Mass. The subject is a Canadian glacier. The terminal moraine is visible in the foreground.

## MINERAL QUIZ

Jerome M. Eisenberg

Name the principal mineral for which these localities are famous:

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. Albany, Maine.                    | 10. St. John's Island, Red Sea,     |
| 2. Almaden, Ciudad Real, Spain.      | Egypt.                              |
| 3. Bingham Canyon, Utah.             | 11. Stassfurt, Saxony.              |
| 4. Cheshire, Connecticut.            | 12. Sulzer, Prince of Wales Island, |
| 5. Island of Elba, Italy.            | Alaska.                             |
| 6. Kelly, New Mexico.                | 13. Tunaberg, Sodermanland,         |
| 7. Kongsberg, Norway.                | Sweden.                             |
| 8. Middleville, New York.            | 14. White Cliffs, New South Wales,  |
| 9. Mesa Grande and Pala, California. | Australia.                          |
|                                      | 15. Woburn, Massachusetts.          |

ANSWERS TO MINERAL QUIZ: (1) beryl. (2) cinnabar. (3) pyrite. (4) barite. (5) hematite. (6) smithsonite. (7) silver. (8) quartz. (9) tourmaline. (10) chrysotile. (11) halite. (12) epidote. (13) cobaltite. (14) opal, var. precious. (15) babingtonite.

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CHATSWORTH

CALIFORNIA

(From Page 15)

pack much of this highgrade. So, I went and stuffed only what I could in my bags, climbed onto my ornery Long-Ear, and started ahead northwest by the sun. But, then . . . after that . . . well, amigos, I shore am kinda hazy about how in hell I got t' this here burg, cuz I'm too fur north. I aimed t' work left and hit them Bear Lakes, then ride due west to the coast. Anyhow, I shore was lucky to stumble onto where them Cocopahs got their black gold. If I'd had a lick o' sense, I'd 've rode back to Yuma. Now, by the Great Horn Spoon, I shore don't know how I can find the place, but I'll take a shot at 'er."

And this, you rovers of the vast open spaces, is the tale of the famous "Lost Pegleg Smith Mine", gleaned from various sources that supposedly are reliable. True, like other such stories, it is vague in spots and full of holes; yet, all Pegleg stories agree on one point: the general direction of the route Smith travelled. And there is one other: that when he made his discovery, he was only a few days northwest of the Colorado River at Laguna, and we know how far a mule can travel through sand in one day. So, if some of you hombres correo take a notion to try for this black gold deposit, Digo que salga V.

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## International Geological Congress To Be Held Next Year In England

The Eighteenth Session of the International Geological Congress will be held in London from August 25th to September 1st, 1948. Headquarters will be in the building of the Geological Survey and Museum, Exhibition Road, South Kensington, London, S.W.7. The Congress was to have been held in 1940 on the invitation of the Geological Society of London, but was postponed due to the outbreak of war.

The subjects provisionally selected for consideration are:

1. Problems of Geochemistry.
2. Metasomatic Processes in Metamorphism.
3. Rhythm in Sedimentation.
4. The Geological Results of Applied Geophysics.
5. The Geology of Iron-Ore Deposits.
6. The Geology of Petroleum.
7. The Geology, Paragenesis and Reserves of the Ores of Lead and Zinc.
8. The Geology of Sea and Ocean Floors.
9. The Pliocene-Pleistocene Boundary.
10. Faunal and Floral Facies and Zonal Correlation.
11. The Correlation of Continental Vertebrate-Bearing Rocks.
12. Earth Movements and Organic Evolution.

A symposium on the Geology, Paragenesis and Reserves of the Ores of Lead and Zinc will be substituted for the usual Special Volume on World Resources.

A number of excursions are being arranged, subject to revision, to be taken before and after the Congress.

Messrs. Thos. Cook & Son, Ltd., have been appointed Official Agents for travel to and from London and for accommodation in London.

All communications should be addressed to the General Secretaries, Eighteenth Session International Geological Congress, Geological Survey and Museum, Exhibition Road, South Kensington, London, S.W.7. All those who propose to attend the Congress are requested to complete and return the "Form C" at the earliest possible date, but not later than September 30th, 1947.

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Grieger's of Pasadena, well known west known west coast mineral firm, has issued two new catalogs. These catalogs have illustrations of popular types of lapidary equipment and supplies. Changeable inserts are provided to accommodate price variations. Readers of the Earth Science Digest may have these two catalogs for the asking. Address: Grieger's, 1633 East Walnut St., Pasadena 4, California. *Please mention Earth Science Digest.*

## Colorado Field Trips

The Colorado Mineral Society has mailed out their list of proposed field trips for 1947. Visiting mineral collectors from other states are invited to attend any of these field trips. For advance information and listings write: Sec'y, Mrs. Mary A. Piper, Room 220, State Museum Bldg., 14th at Sherman, Denver, Colorado.

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